Docket No.: 042390.P7045D

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Ramalingam, et al.

Application No.: 09/874,666

Filed: June 5, 2001

For: A Controlled Collapse Chip Connection (C4) Integrated Circuit Package Which Has Two Dissimilar Underfill Materials

Examiner: David E. Graybill

Art Group: 2827

PRELIMINARY AMENDMENT

BOX RCE
Assistant Commissioner for Patents
Washington, DC 20231-9998

Sir:

Please amend the above-identified Application as follows:

IN THE CLAIMS

Following is a complete set of claims as amended with this Response. This complete set of claims excludes claims 7-14 and 26-30, cancelled without prejudice, and requests examination of new claims 31-48.

31. (New) An integrated circuit package comprising:

a substrate;

an integrated circuit attached to the substrate;

a first material dispensed at a first temperature between the substrate and the integrated circuit as underfill; and

a second material dispensed at a second temperature less than the first temperature around edges of the integrated circuit and the first material to act as a circumferential fillet, the second material having a lower adhesion property than the first material.

32. (New) The integrated circuit of claim 31, wherein the second material is an anhydride epoxy.

33. (New) The integrated circuit of claim 31, wherein the substrate is baked at a temperature greater than a temperature at which the first and second materials are applied.

34. (New) The integrated circuit of claim 31, wherein the second material seals the first material.

35. (New) The integrated circuit of claim 31, wherein the second temperature is within a range of 80 degrees Celsius to 120 degrees Celsius.

36. (New) The integrated circuit of claim 31, wherein the second material being dispensed only after the first material is dispensed and the integrated circuit is heated to a third temperature being greater than the first temperature.

37. (New) An integrated circuit package comprising:

a substrate having a first surface and a second surface;

an integrated circuit coupled to the first surface of the substrate;

a first material coupled to the integrated circuit and the first surface of the substrate, the first material operating as underfill between the integrated circuit and the first surface of the substrate; and

a second material attached to the integrated circuit and the first surface of the substrate, the second material forming a circumferential fillet surrounding both edges of the integrated circuit and the first material.

38. (New) The integrated circuit package of claim 37, wherein the substrate to electrically connect solder balls on the first surface to solder balls on the second surface.

39. (New) The integrated circuit package of claim 37, wherein the first material is dispensed at a temperature within a first temperature range.

40. (New) The integrated circuit package of claim 39, wherein the first material being positioned for coupling to the integrated circuit and the first surface of the substrate under a wicking action.

41. (New) The integrated circuit package of claim 39, wherein the second material is dispensed at a temperature within a second temperature range having an average temperature less than an average temperature associated with the first temperature range.

42. (New) The integrated circuit package of claim 41, wherein the average temperature of the second temperature range is at least ten degrees Celsius less than the average temperature of the first temperature range.

43. (New) A printed circuit board comprising:

a plurality of solder balls; and

an integrated circuit package coupled to the plurality of solder balls, the integrated circuit package comprises

a substrate including a first surface and a second surface,

an integrated circuit coupled to the first surface of the substrate,

a first material coupled to the integrated circuit and the first surface of the substrate, the first material operating as underfill between the integrated circuit and the first surface of the substrate, and

a second material attached to the integrated circuit and the first surface of the substrate, the second material forming a circumferential fillet surrounding both edges of the integrated circuit and the first material.

44. (New) The printed circuit board of claim 43, wherein the substrate to electrically connect solder balls on the first surface to solder balls on the second surface.

45. (New) The printed circuit board of claim 43, wherein first material is dispensed at a temperature within a first temperature range.

46. (New) The printed circuit board of claim 43, wherein the first material being positioned for coupling to the integrated circuit and the first surface of the substrate under a wicking action.

47. (New) The printed circuit board of claim 43, wherein the second material is dispensed at a temperature within a second temperature range having an average temperature less than an average temperature associated with the first temperature range.

48. (New) The printed circuit board of claim 47, wherein the average temperature of the second temperature range is at least ten degrees Celsius less than the average temperature of the first temperature range.

REMARKS

This preliminary amendment is filed with a Request for Continue Examination (RCE). Although Applicant respectfully traverses the rejections set forth in the prior Office Action, the claims have been cancelled without prejudice and additional claims (31-48) have been added to cover inventive aspects of the invention. Examination of pending claims 31-48 is respectfully requested.